DEPARTMENT *of* INFRASTRUCTURE, ENERGY *and* RESOURCES, TASMANIA

BRIDGEWORKS SPECIFICATION

B52 - REINFORCED SOIL WALLS July 2004

Includes previous B51, B52

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B52.1 SCOPE

This Specification sets out the requirements for the design, preparation of construction drawings, supply of components and construction of reinforced soil retaining walls.

The concept of the finished wall is shown on the Concept Drawings.

Precast concrete facing panels *or blocks* are to be used at the face of the reinforced volume of soil. Where shown on the Drawings, for staged construction, a wire wall shall be provided.

B52.2 REFERENCES

The following Standards and Specifications are referred to in this Specification:

A.S. 1110 ISO metric hexagon bolts

A.S. 1289 Methods of testing soils for engineering purposes

A.S. 3679 Structural Steel

A.S. 4678 Earth retaining structures

A.S. 4680 Hot dip galvanised (zinc) coatings

H.B.77 Bridge Design Code (previously Austroads Bridge Design Code)

ASTM D-1752, D3080-72

Standard Brief for Professional Services

Specifications B1, B10, B11and B14

B52.3 ABUTMENT LOADS

Bridge abutment loads applied at the bearings are either advised by the bridge designer or shown on the Drawings.

B52.4 DESIGN

The design shall be in accordance with the Standard Brief for Professional Services, the Bridge Design Code and AS 4678 with that order of precedence.

B52.5 PLAN PRESENTATION

Drawings shall comply with the requirements of the Standard Brief for Professional Services

B52.6 MATERIALS

B52.6.1 Concrete Facing Panels *or blocks*

Facing panels *or blocks* shall be manufactured in accordance with the Drawings and the Specifications B10 - Supply of Concrete, B11 - Reinforced, Prestressed and Mass Concrete and B14 - Precast Concrete Units.

B52.6.2 Reinforcing Strips and Tie Strips

*Steel t*ie strips shall be shop-fabricated of hot rolled steel. Reinforcing strips shall be hot rolled from bars to the required shape and dimensions. Tie and reinforcing strips physical and mechanical properties shall conform to AS 3679, Grade 250 or greater.

They shall be cut to lengths and tolerance shown on the plans. Holes for bolts shall be punched in the location shown. Galvanising of tie and reinforcing strips shall conform to AS 4680.

All tie and reinforcing strips shall be carefully inspected to ensure they are true to size and free from defects that may impair their strength and durability. *Tensar grid soil reinforcing shall be acceptable when appropriate to the design.*

B52.6.3 Fasteners

Bolts and nuts shall be strength Grade 8.8 High Strength precision Bolts to AS 1110, galvanised with diameter 12 mm. *Fasteners of other materials shall be certified for the design life of the structure.*

B52.6.4 Joint Filler

Vertical Joint

*Where required v*ertical joint material shall be either flexible open cell urethane foam strips or 500 mm wide filter fabric strips as specified on the Drawings.

Horizontal Joints

*Where required f*iller for horizontal joints between panels shall be resin bonded cork filler conforming to ASTM D-1752 (Type II) or equivalent.

B52.6.5 *Wall Footing*

The concrete for the levelling pads shall conform with Specification B10. *Compacted granular fill shall be Base A material complying with Specification R40.*

B52.6.6 Select Fill for Reinforced Soil Block

Select fill material within the reinforced soil block shall be sound granular material of natural or industrial origin, free from organic or other deleterious material conforming to the physical, chemical and electrochemical limits as specified and shall not be subject to breakdown under compaction.

The Material shall meet the following physical limits as determined by AS 1289-C6.1.

AS Sieve size (mm)	53	0.075
Percent by mass passing	100	0-15

Prior to carrying out the above grading analysis, pretreatment of the material may be required.

If more than 15 percent passes the 75 micron sieve, then the material shall be acceptable if the particle size distribution as determined by AS 1289-C6.3 shows the following:

(a) Less than 10 percent of the material is smaller than 13.5 micron

or

(b) If between 10 and 20 percent of material is smaller than 13.5 micron, the effective angle of internal friction of the material when compacted to 95 percent of its maximum dry density as determined by AS 1289-E1.1 (Standard Compaction) at optimum moisture content is not less than 36 degrees as determined in a standard direct shear test (ASTM D3080-72).

The material shall meet the following chemical and electrochemical criteria limits:

(a) The pH value as determined by AS 1289-D3.1 lies between 5 and 10

and

(b) The electrical resistivity at 20^{o}C as determined by AS 1289-D4.1 is greater than 5,000 ohm cm.

If the resistivity is less than 5,000 ohm cm but greater than 1,000 ohm cm, then, the material shall be acceptable provided that:

(a) The chloride (Cl^{-}) content is less than 200 mg/kg

and

(b) The sulphate (SO_4^{2-}) content is less than 1,000 mg/kg.

The Contractor shall provide the source of the material and NATA endorsed test certificates to demonstrate that the proposed materials meet the Specification requirements.

Changes of material sources shall be advised to the Superintendent with test certificates as above, at least three (3) working days prior to use.

B52.6.7 Cement Stabilised Soil

A cement stabilised soil layer for placement of the abutment sill shall be prepared in a mixer using a selected sandy loam or low plasticity quarry grit to which 4% by mass of portland cement is added and thoroughly mixed to produce a uniform product. Sufficient water shall then be added to provide a material of optimum moisture content for compaction.

Low strength concrete shall not be permitted.

B52.7 RECEIPT OF PANELS

On receipt of a consignment of panels *or facing units*, the Contractor shall inspect the*m* to ensure that they are free of chips, cracks, or fractures.

B52.8 EXCAVATION

Excavation shall be carried out in accordance with Specification B1.

B52.9 CONSTRUCTION

B52.9.1 *Wall Footings*

The concrete levelling pads shall be constructed in accordance with Specification B11. *Compacted granular fill shall be compacted to a minimum characteristic dry density ratio of 95% Standard Compaction in accordance with Specification B1.*

B52.9.2 Erection of Facing

Erection of the precast *reinforced soil facing*, including installation of accessories, in conjunction with the earthworks for the bridge abutments and road approaches, shall be carried out in accordance with the Specification and other requirements of the Manufacturer.

B52.9.3 Placement and Compaction of Select Fill for Reinforced Soil Block

Select fill placement shall closely follow the erection of each lift of panels. At each reinforcing strip level, the select fill shall be compacted and levelled before placing the strips. Select fill placement and compaction shall be accomplished without disturbance or distortion to the reinforcing strips and *facing* so that the reinforcing strips and *facing* alignment are maintained within tolerance.

At the end of each day's operations the Contractor shall shape the last level of select fill so as to permit run off of rainwater away from the wall face.

Select fill shall be spread in horizontal layers not exceeding 200 mm in thickness. Each layer shall be compacted to a minimum characteristic dry density ratio of 95% of Standard Compaction.

Rollers of greater than 1 tonne static weight shall be kept back 1.5 metres from the face of the wall. Compaction of the select fill material within the 1.5 metre strip adjacent to the wall shall be achieved by light mechanical tampers to give the same density as in the remainder of the select fill.

The select fill shall initially be brought up to a level to allow placement of the cement stabilised layer and subsequently the construction of the abutments.

The top of the select fill shall be constructed parallel with the finished surface of the road.

Above the select fill, the embankment shall be constructed in accordance with Specification B1 - Placement of Special Fill.

B52.9.4 Placement and Compaction of Cement Stabilised Soil Layer

The cement stabilised soil layer shall be spread in layers not exceeding 200 mm in thickness. Each layer shall be compacted to a minimum characteristic dry density ratio of 95% of Standard Compaction.

The level of the top surface of the layer shall be within -20 mm to +0 mm of the reduced level on the Drawings and the thickness shall be the thickness shown on the Drawings.

B52.9.5 Tolerances

i)	Panel Wall	
a)	Departure from plan position at base of wall shall not exceed	25 mm
b)	Variation from vertical	5 mm in 2.5 m
c)	Maximum allowance for inequalities	5 mm in 2.5 m
d)	Reduced level of top of wall	-25 mm to +25 mm
e)	Relative displacement of adjoining components shall not exceed	10 mm
f)	Departure from alignment	10 mm
ii)	Wire Wall	
a)	Variation from vertical	15 mm in 3.0 m
b)	Maximum allowance for inequalities	25 mm in 4.5 m
iii)	Concrete Base	As per Specification B11 - Tolerances

B52.10 FILLING IN FRONT OF REINFORCED SOIL RETAINING WALL

All timbering, bracing, rubbish or silt shall be removed before filling is placed.

Except where specified to the contrary, spaces excavated for foundations and not occupied by permanent work shall be back-filled to the level of the surrounding ground with material, as specified in Specification B1, which shall be placed in horizontal layers not exceeding 200 mm in thickness (loose). Each layer shall be compacted to a minimum characteristic dry density ratio of 95% of Standard Compaction.

B52.11 PAYMENT

Payment for the design of the reinforced soil wall shall be included in the tendered rate for the structure.

The rate in the Bill of Quantities for the supply and erection of reinforced soil units shall include full payment for providing all labour, the hire of any specialised handling equipment, the manufacture of facing units, the removal of components from site storage area and delivery to the point of erection, the supply and handling of panels and reinforcing strips, erecting panel elements to the lines and grade shown on the Drawings and any other costs incurred in the erection of the reinforced soil walls.

Where applicable, the rate in the Bill of Quantities for the erection of temporary wire mesh walls shall include full payment for providing all labour, the hire of any specialised handling equipment, the removal of components from site storage area and delivery to the point of erection, the handling of components and reinforcing strip, erecting the wire wall to the lines and grade shown on the Drawings and any other costs incurred in the erection of the wall.

Payment for filling shall be based on the measured, compacted in place volume as determined from design cross sections extending from foundation level.

B52.12 HOLD POINTS

The following hold point has been identified in this Specification.

Clause	Hold Point	Works Held
B52.6.6	Receipt of test certificates	Supply and placement of Reinforced Soil Fill.